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DOES TRADE OPENNESS REDUCE POVERTY? A VIEW FROM TRANSITION ECONOMIES

Master's thesis

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Allowed for defence on ……..
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I have written this master's thesis independently. All viewpoints of other authors, literary sources and data from elsewhere used for writing this paper have been referenced.

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Abstract

The poverty-trade openness relationship remains unclear in previous studies. Although considerable research has been devoted to the effect of trade liberalization on poverty, rather less attention has been paid to the impact of trade openness. This dissertation examines whether potential key complementary factors, such as financial development, democratic governance, and technological capabilities maximize the gains from trade openness. Using a panel of transition countries over the period 1990-2013 the paper confirms the lack of importance of complementary factors. Higher trade openness in its own is associated with an increase in extreme poverty. Besides, there is no significant estimated effect of trade openness on poverty reduction even if it is accompanied with well-developed financial sector and strong technological capabilities. The paper concludes that potential key complementarities do not appear in practice as such broad factors are not enough to overrun the negative effect of trade openness on poverty.

1. Introduction

One of the tenets of the transition process from centrally planned economies to market economies is that opening up to international trade improves economic performance (Desai, 1997). On the other hand, extreme poverty as a matter of social welfare still exists. In transition economies, absolute poverty is falling very sharply at the same time countries improve their participation in the international trade[1]. Trade openness has been one of the most important economic policies after moving from closed to an open economy. To which extent opening up to international trade affects extreme poor people is the key motivation for this dissertation.

Opening up to international trade does not guarantee success. It opens up opportunities for those people who are willing or able to take advantage of them. In most cases very poor are at the very bottom of the pecking order in terms of ability to exploit trade opportunities. Trade should not be seen in isolation. Even if there is a pro-growth effect, it still requires complementarities in order to reduce poverty (Topalova, 2004; Harrison, 2006/2008/2013; Le Goff and Singh, 2014). Under these circumstances, complementary factors should accompany trade openness to enhance the ability of poor people to satisfy basic needs[2]. This does not imply that they are always necessary to enable trade to have poverty reducing effects—it strongly depends on the country groups which are studied (Winters et al., 2004).

The dissertation aims to find out whether trade openness reduces poverty in transition economies. In order to achieve this aim, this study includes two research tasks[3]. First, whether trade openness can alone reduce poverty in transition countries. Second, whether potential key complementary factors financial development, democratic governance and technological capabilities enhance the effectiveness of trade for poverty reduction[4]. Easier loans and cheap credits improve firm productivity and the benefits of trade openness will trickle down to the poor workers. Firms which have strong technological capability enable the poor to benefit from knowledge transfers via international trade. Lastly, more efficient allocation of goods and

[1] See Appendix 1.

[2] Poverty is a deprivation in well-being and comprehends a set of important dimensions: low level of health, education and living standards (World Bank, 2010).

[3] The diagram in Appendix 2 represents two research tasks in a more illustrative way.

[4] They are not the only factors that may matter. Based on the available data in transition countries these are the ones which I can analyze in econometric analyzes. Due to data limitations, it was not possible to empirically test the effect of other potential key complementary factors, such as labor market flexibility, firm entry exist flexibility, corruption, political instability, roads and irrigation.

services increases trade intensity under democratic governance. Furthermore, an income which people get from greater openness to trade could be more likely to spread equally.

The main contribution of this paper is that it observes how some key country-specific factors affect the link between trade openness and poverty in transition countries. This study focuses on the empirical relationship between poverty and trade openness by using a panel of 28 transition countries over the period 1990–2013. There is a lack of empirical studies on the trade-poverty relationship in transition countries, which is another motivation for this research. The literature review of present study focuses on the abundant literature relating to the relationship between trade and poverty reduction in the least developed and developing countries (Winter et al ., 2004; Topalova , 2004; Agenor, 2004; Harrison , 2006/2008/2013; Le Goff and Singh, 2014).

In this study results show that higher trade openness in its own is associated with an increase in poverty which is similar to findings of empirical studies of Le Goff and Singh (2014) for African countries. However, results contradict the predictions of Heckscher-Ohlin model of trade. A key novel finding of this dissertation is that undertaking the investigated complementary broad factors combined with trade openness do not necessarily reduce poverty, as one could possibly expect in theory. The gains from trade openness according to the findings of this dissertation are limited because the benefits do not trickle down to the poor. This result likely reflects the fact that the poor do not actively participate in the welfare. Moreover, the transition from closed economy to open one is accompanied by technological changes. So, skilled labor might be more demanded than unskilled labor on the job market in transition countries. In this case, the poor cannot avoid the costs of trade openness.

There is no doubt that trade openness improve overall economic performance in transition countries but gains from greater openness to trade may not be equally distributed among the poor and the rich. The potential costs of trade openness (higher income inequality) most likely outweigh potential benefits (higher overall growth)[5] in transition countries. The empirical findings support the idea that greater income inequality is a consequence of greater openness to trade in poor countries (Milanovic and Squire, 2005; Easterly, 2006). Naschold (2002) claims that poverty reduction can be considerably improved by income equality. Higher trade

[5]Dollar and Kraay (2013) suggest that trade leads to faster growth.

openness might drive people into deeper poverty because higher income inequality is associated with higher poverty. This dissertation does not focus on inequality but it is worth mentioning, however, that poverty and inequality are intimately linked. That is why I can suggest that an equal income distribution would be an important step forward for poverty reduction.

The results provide clear evidence that there is a lack of complementary factors such as financial development, democratic governance and technological capabilities in transition countries. Furthermore, if the government becomes more democratic in transition countries, the interaction of democratic governance with trade openness becomes significant and positive[6].

The rest of the paper is organized as follows. Section 2 reviews the ambiguous effect of trade openness on poverty and the role of potential key complementary factors. In section 3, data used to perform the empirical analysis and methodology are described. Sections 4, 5 and 6 offer some results and concluding remarks.

2. Literature Review and Theoretical Framework

2.1. Trade openness and poverty

This section aims to review the literature upon which my empirical analysis is based. It starts with the theoretical analysis of the impact of trade openness on poverty. Then, I discuss the potential key complementary factors that can enhance the beneficial effects of trade openness on poverty reduction. Agenor (2004) claims that trade can affect the poor in various ways. Trade openness might be either beneficial or harmful for the poor. Therefore, empirical analyses of the impact are important in order to figure out net effects on the poor. The results from cross-country and case studies remain unclear (Winters et al., 2004; Ravallion, 2004; Harrison, 2006).

[6] Individual perception bias is a main limitation of democracy measure. In this study, institutionalized democracy is drawn from broadly used POLITY IV dataset. It is about how much the president is checked by parliament. The other possibility to measure democracy which is not estimated in this dissertation is democracy index from Freedom House. On the other hand, it measures human rights and freedom.

There exists a gap between the theoretical and empirical literature of trade openness and poverty, particularly there is often a lack of clear differentiating of notions of trade liberalization and trade openness in the related literature linking trade and poverty[7]. Trade openness is not always a result of trade liberalization. Importantly, they are related notions but not the same. Trade liberalization involves reductions in trade barriers which lead to increase openness to trade, whereas more openness increases the overall magnitude of exports and imports over time. Some economists define freer trade as openness in trade (Bhagwati and Srinivasan, 2002), others describe it as just a trade intensity (Pritchett, 1996). However, according to Harrison (2006), trade openness and trade liberalization is associated with fewer trade tariffs.

Literature offers two approaches to the analysis of the effect of trade on poverty: static and dynamic (Bhagwati and Srinivasan, 2002). In the static approach, many economists focus on Heckscher-Ohlin (HO) theorem to investigate trade effects on inequality and poverty (Harrison, 2006; Le Goff and Singh, 2014). The Heckscher-Ohlin model suggests that after opening to international trade countries will specialize and export the goods in which they are factor abundant (Ohlin, 1933). Transition countries present high ratio of labor to capital (Lane et al., 2002). Therefore, according to Heckscher-Ohlin theorem, they have a comparative advantage in labor-intensive goods. More trade openness in transition countries might encourage the development of labor-intensive activities and provide income for poor people. The Stolper–Samuelson theorem (SST) is a basic theorem in Heckscher–Ohlin trade model which claims that the abundant factor (poor unskilled labor) sees an increase in its real income (wage) when a country opens up to international trade (Stolper and Samuelson, 1941).

Evidence against Heckscher-Ohlin model is based on the findings of Davis and Mishra (2006), who point out that SST holds only in the case if imported goods can be substituted by exported goods. In addition, they claim that if all goods are produced in labor abundant countries then SST suggests an increase in wages of the poor (unskilled labor). An important implication of

[7] Le Goff and Singh (2014), Winter et al. (2004), Chang et al. (2009), Kpodar and Singh (2011) use trade openness for empirical analysis, but their literature review's main part is based on trade liberalization. One reason for this is that there are few theoretical and empirical literature on poverty-trade openness relationship. There are many papers about trade liberalization and poverty which are relevant. In this dissertation, I use trade openness as a key variable, on the other hand, this study focuses on both trade liberalization and trade openness in the literature review.

this evidence is that specific sector model is much more realistic than HO model. According to specific sector model gains from international trade are allocated among poor workers according to sectors where they are employed (Harrison, 2006). She claims that if the poor work in the export-oriented sector, their real wages increase. They become winners. If they are employed in import-competing sectors, they are losers. In contrast to this evidence, Heckscher-Ohlin model suggests that winners and losers can be recognized according to whether they are employed in labor intensive or capital intensive industries (Harrison, 2006). Likewise, Topalova (2004) finds that trade tariffs are negatively correlated with poverty due to the imperfect mobility of labor across sectors in India. Workers cannot easily move from one sector to another in developing countries. If regulations allow workers to easily relocate among firms, then the negative effect of trade on poverty reduction will fade away over time.

In dynamic approach, trade openness promotes economic growth, which in its own supports poverty reduction. In the last decade, some economists have suggested that trade openness is related to rapid growth (Sachs and Warner, 1995). But on the other hand, growth does not have consistent effects on income distribution (Ravallion, 1995; Squire et al., 1998). In later studies, Dollar and Kraay (2013) claim that trade liberalization is a reason of growth in average income category. Consequently, there is an increase in income of people in the bottom quintile, leading poverty reduction. There is a significant problem of causality. Rodrik et al. (2001) emphasize that trade openness can be a result rather than a necessity for growth. However, based on the dynamic approach the effective engine to alleviate poverty is trade, which has at first positive effect on economic growth and this, in turn, is the key to poverty reduction.

Cross-country studies have no clear-cut conclusion on the effect of trade on poverty (Beck et al., 2007; Kpodar and Singh, 2011). There is a rapidly growing literature on trade and poverty, which indicates a strong negative relationship (Spilimbergo et al., 1999; Fischer, 2001; Easterly, 2002). But others criticize the robustness and significance of the poverty reduction through trade because greater opening up to international trade also leads to higher inequality (Besley and Burgess, 2003; Milanovic and Squire, 2005; Easterly, 2006).

A number of recent studies resolve the ambiguity of the impact of trade on poverty. They suggest that there should be other conditions that give opportunities for poor people to have gains from greater trade openness (Winters, 2004; Le Goff and Singh, 2014). Harrison (2006) suggests that globalization is more likely to benefit poor when there are complementary

policies such as wide investments in human capital, technological support for farmers, low inflation, good institutions, policies which encourage private credits and infrastructure. Poor people need better education and access to finance in order to benefit from trade. Le Goff and Singh (2014) claim that higher poverty reduction is associated with higher trade openness in African countries only if they have a well-developed financial sector, strong human capital and high quality of bureaucracy. Winters et al. (2004) show that countries without restrictions on trade have faster economic growth than countries with tariff barriers. Besides complementary policies might allow farmers to benefit from trade openness, particularly via infrastructure and agricultural extension services. Grown (2014) tests the impact of trade on the distribution of income among men versus women. She claims that complementary policies of access to secondary education, stronger property rights and access to credit markets play a significant role for women in Africa and South Asia. Developing countries have liberalized their policies over the last twenty years, but there has not been much development in some other conditions like infrastructure, irrigation, access to credit, education and health services. Thus, even though trade has been liberalized, little success for poverty reduction has been achieved (Balat and Porto, 2004). The literature shows no consensus on trade-poverty relationship meaning that potential key complementary factors are needed.

2.2. Potential key complementary factors

As previous literature has outlined the role of complementarities, in this section I will take a closer look at potential complementary factors that might enhance the beneficial effects of trade openness on poverty. There are some key country-specific characteristics which might have a relevant impact on the diffusion of benefits from trade openness on poor people, such as education, irrigation, infrastructure, health, agricultural extension services, bureaucracy quality, financial depth, democratic governance, technological capability, labor market flexibility, corruption, political instability and business regulation. They should be implemented simultaneously with trade openness to help the poor and avoid absolute poverty. This dissertation focuses only on three of them, financial development, technological capability, and democratic governance.

The reasons why focusing on these complementarities are as follows. Without well-developed financial sector firms do not have access to cheaper financial resources, so they will not be able to expand their production and actively participate in trading system. Firms which have the capability of adapting technologies gain a competitive advantage on the market. They are able to produce and export goods efficiently. And finally, under democratic government, there is more efficient allocation of goods and services which are more likely to maximize gains from trade. Generally, these country-specific factors which are studied in this dissertation are broad. First, infrastructure and education are part of technological capabilities, they are sub-indicators for this index (Fagerberg, 2007/2008/2009). Second, inflation determines the effect of financial development on the poor (Harrison, 2006). Third, corruption is linked to governance system, mostly to democratic government (Czap et al., 2012). In addition, there is an absence of empirical studies on these complementarities, which is another reason to focus only on mentioned country-specific factors.

There is potential evidence that trade openness combined with financial development, technological capabilities and democratic governance plays a significant role in poverty reduction. Firstly, the direct effects of these country-specific characteristics on poverty are analyzed. By discussing the validity of potential key complementary factors I aimed to reveal their direct effects on poverty reduction. Based on earlier studies trade openness alone can also be expected to increase extreme poverty (Winters et al., 2004; Agenor, 2004). In order to overrun possible negative effects on poverty, potential key complementary factors would affect poverty not only interacted with trade openness, but they should also have positive direct effects on poverty reduction. Trade openness can be either costly or helpful for the poor. There might be negative effects of trade. If potential key complementary factors do not have sufficient positive effects on poverty reduction, then the costs of trade openness will outweigh the benefits, so the poor will not be better off. Next sections show that the direct positive effects of financial development, technological capabilities, and democratic governance, on poverty reduction is not always the case in the empirical literature[8]. Therefore, the joint effects might be dominated by the cost of trade openness. Second, I will describe the combined effect of trade openness with three different country-specific factors.

[8] See Appendix 3.

2.2.1. Financial development and poverty: direct links

Empirical studies on financial development and income distribution show that financial deepening can improve growth levels and in return reduce income inequality (Beck et al., 2007). Well-developed financial sector increases an income of the poor more than average growth, particularly this ends up with lower income inequality. Similarly, Kpodar and Guillaumont (2011) argue that well-developed financial sector reduces poverty directly and also indirectly through economic growth. In contrast to Beck et al. (2007), Kpodar and Guillaumont (2011) do not focus only on private credit indicator, but also examine the impact of the ratio of money to GDP[9]. When private credit is used, the relationship between financial development and poverty becomes statistically insignificant.

While some economists agree that private credit has a significant effect on poverty reduction, others find a lack of any evidence of an impact of financial development on absolute poverty. Fowowe and Abidoye (2013) and Chigumira and Masiyandima (2003) claim that financial development will not provide the cheaper and easier loans for extreme poor. Main reason for not offering loans to the poor is a high risk of default and problem with moral hazard. Similarly, Caner and Arestis (2004) suggest that if financial development is achieved without maintaining macroeconomic stability, it often ends up with crises and also increases economic inequality. Countries which have integrated financial markets should be careful because poor households suffer from currency crisis much more than rich people (Harrison, 2006).

Financial development and trade openness: combined effect on poverty

Financial development is considered as an essential factor for economic growth. Recently considerable attention has been paid to complementarity of trade openness and financial development (Shin and Yang, 2006). Firms are more likely to be export-oriented if they are bounded by lower credit constraints (Melitz, 2004). Credit constraints matter for export. By exporting labor-intensive goods firms get profit and poor unskilled workers employed in these firms could potentially get higher wages as a result. Export activities are positively associated

[9] The result that financial development is good for the poor holds only when financial development is measured by the ratio of money to GDP (M3/GDP). Based on available data in transition countries I use only private credit/GDP indicator.

with well-developed financial sector. If local goods produced by poor people are not competing with imported goods then trade would lead to increase real incomes of the poor (Harrison, 2006). However, there is a consensus that higher import competition leads to increase poverty rates (Davis and Mishra, 2006; Harrison, 2013). When the poor are employed in import-competing sectors, this increases a duration of unemployment and also rises informality, which caused higher poverty in South Africa (Davies and Thurlow, 2009). The previous studies indicate that potential key complementary factor - financial development is pro-growth and by combining this effect with trade openness is beneficial for poor (Le Goff and Singh, 2014; Chang et al., 2009).

More financial opportunities enhance business and create new jobs, as a result, poor people get hired. Well-developed financial sector increases the capacity to give more loans and cheaper credits to firms, so more goods are produced efficiently. Moreover, participation in the trading system will be much beneficial for poor workers. According to Heckscher-Ohlin (HO) theorem, if countries are labor abundant then they will export labor-intensive goods. Under well-developed financial sector they will export more these types of goods, so the poor who are employed will experience an increase in real income when a country opens up to international trade. HO assumes labor mobility across sectors (not countries), but if firms are enhanced by financial resource availability, the poor can more easily move to sectors with comparative advantage. And given the assumption of perfect mobility of employees across sectors, these together should bring a change in employment structure.

2.2.2. Democratic governance and poverty: direct links

The relationship between poverty and democracy is ambiguous. Ross (2006) claims that democracy does not function well for poor individuals. He claims that democracy does not influence infant and child mortality rates which are used as a proxy for measure of welfare of the poor. It is true that democratic government spends more money on health and education than authoritarian, but this kind benefits are for middle and rich groups, not for poor individuals.

Varshney (2002) suggests that democratic countries do not have better effects than authoritarian regimes in support of poverty reduction in developing countries. There is no long-

run relationship between democracy and growth when democratization is accompanied by the poor rule of law. Such countries face poor civil rights, high-income inequalities and differences in efficiency between firms. A similar analysis is done by Popov and Polterovich (2005), who find that democracy negatively impacts economic growth in transition countries. Likewise, Fabella and Oyales (2008) find that when democracy is seen in isolation then more democratic governance is negatively associated with poverty reduction in developing countries. However, when trade openness interacts with democratic government the result becomes positive.

Democratic governance and trade openness: combined effect on poverty

Democracy is broadly known as one of the goals of development. It is important to investigate the relation to other goals, such as poverty reduction and more income equality, higher life expectancy and educational levels. A democratic governance may be more likely to ensure that trade openness reduces poverty in African countries (Oyeshile, 2009). Rational and law-based trading system will work under the democratic government. Trade openness should be complemented with democratic governance to reinforce its contribution to economic growth and to provide opportunities for poor people that growth creates (Fabella and Oyales, 2008).

Democratic government is known as a standard-setter. It maintains the benefits of trade openness. Firms need support from the government, in terms of low formal and informal costs, which means to be corruption free. One of the primary aims of democracy is the elimination of corruption which would enhance beneficial effects of trade openness. It might increase wages that are good for the poor who are working in these firms.

There is less efficient allocation of resources under corruption which leads higher losses from trade. Corruption is an informal tax that is costly for overall welfare (Tanzi, 1998). Income distributions are mostly regulated and controlled by the government. Higher corruption index leads to increase income inequality (Gupta et al., 2002). Czap et al. (2012) claim that corruption is lower in countries which have unstable democratic government and higher in stable authoritarian governance. The reason why corruption may be lower in democratic governance

is that elections are much more frequent than in authoritarian countries, this creates uncertainty and people do not know whom to corrupt (Bohara et al., 2004).

Corruption weakens income, expenditure on health, education and government effectiveness to reduce poverty (Tanzi, 1998). What we can say exactly is that government system which encourages the development of native business and enterprise is the source to lift people out of poverty. How poor people benefit from trade openness depends mostly on the role of government. Democratic government is associated with lower corruption, which in turn leads to a decrease in trade barriers and an increase in trade openness (Bandyopadhyay and Roy, 2006). So, it could be expected that the positive effects of trade on poverty will be stronger in a country with lower corruption and more democratic system of governance. Due to low corruption, the income from trade are less likely to be appropriated by rich people, particularly free corruption is a reason for income equality (Gupta et al., 2002).

2.2.3. Technological capabilities and poverty: direct links

Technological development is the driving force of long-term economic development (Sollow, 1957). If developing countries have strong technological capabilities and good accessibility to knowledge then they might be able to reduce poverty (Ventura, 2001). But this type of economic growth could not eradicate poverty in African countries (Bhalla, 2002).

Fagerberg and Srholec (2008/2009) found impediments which less-developed countries face in their catching up process with developed countries. They suggest that economic development strongly requires to be accompanied by technological capabilities. On the other hand, technological capabilities have an insignificant effect on development if it is not supported by social institutions such as education, governance and also religions. If there are some impediments to technological capability this will be an obstacle for economic development and also poverty reduction.

Technological Capabilities and trade openness: combined effect on poverty

Kim (2000, p: 11) defines technological capabilities (TC) as "the ability to make effective use of technological knowledge in production, engineering, and innovation in order to sustain competitiveness in price and quality". Technological capabilities are important for technological development and technology transfers. It enables firms to accelerate innovation and improve economic environment. The idea that economic growth has recognized technological capabilities as its driving engine goes back to Joseph Schumpeter.

People are able to take advantage of new opportunities offered by trade openness when countries have strong technological capabilities. Neoclassical and endogenous growth theories suggest that technological differences across countries are the main reason of economic inequality in the world (Solow, 1957; Romer, 1990).

Cohen and Levinthal (1990) examine the role of persistent investment in technological activities which are significant to create "absorptive capacity". It is defined as "the ability of a firm to recognize the value of new, external information, assimilate it and apply it to commercial ends is critical to its innovative capabilities" (Cohen and Levinthal, 1990, p: 128). Trade openness complemented with strong technological capability has an international flow of technology and knowledge among people and firms that increase standards of living, therefore easing absolute poverty. Recently, several authors Harrison (2013) and Hall et al. (2013) have proposed how trade openness affects inequality through important channels of innovation and technology. Innovation is a source of better productivity and greater revenue per employee, which in its own affects income distribution. As mentioned above, Naschold (2002) links lower inequality to lower poverty and claims that unequal income distribution might be a reason of higher poverty.

Technological capability is also known as the capacity to create technologies. Absorptive capacity, human capital, and technological capabilities are prerequisites for effective technology transfer via international trade, which is an important diffusion channel (Keller, 2004). Chen and Gupta (2006) figure out trade openness and growth relationship through knowledge spillovers. If firms have strong technological capabilities where poor people are employed, then they can more easily learn from foreign knowledge transferred via international

trade. These additional positive effects of exposure to trade might potentially trickle down to the poor as well. This can have special effects on performance of firms and at the same time on wages of the poor employed in these firms. This might create new technologies and use of productive resources efficiently, which is expected to be a long-run factor of firm growth.

To sum up, based on the previous studies, no certain agreement has been established on the effects of trade openness on poverty. Despite the strong evidence that trade openness generates growth, there is no clear theoretical and empirical claim for ways through which trade might have an effect on poverty reduction. However, this section has analyzed and explained the trade openness effects on poverty by focusing on some country-specific factors that would change the trade–poverty relationship.

3. Empirical Analysis

3.1. Data

A series of cross-country studies on trade-poverty relationship focus on the least developed and developing countries. Using a broad sample, which has higher degrees of freedom, would remain problematic because it may introduce unwanted heterogeneity (Ravallion, 2004; Harrison, 2006; Kpodar and Guillaumont, 2011). To avoid this problem the present study focus only on the transition countries, data are available for a limited number of years which dictated the size of panel dataset[10].

There is high variability in poverty levels over time, but on average poverty rates have declined in transition countries[11]. In some countries, population continues living on less than 1.90 $US a day while high-income transition countries almost eradicated poverty[12]. The summary statistics for trade openness and poverty rates are presented in Appendix 5.

[10] Detailed data sources are provided in Appendix 4.

[11] The number of people who live on less than $1.90/day has decreased intensively in the last decades (Word Bank, 2015).

[12] A high-income economy is defined by the World Bank as a country with a gross national income (GNI) per capita above US$12,735 in 2014. In transition economies, following countries are high-income countries: Estonia, Latvia, Lithuania, Czech Republic, Croatia, Poland, Russia, Slovak Republic, and Slovenia. See Appendix 6.

The dataset covers the period of 1990-2013 and contains a sample of 28 transition countries[13] (see Appendix 7). The incidence of poverty (headcount index) and depth of poverty (poverty gap) at $1.90 a day (2011 PPP)[14] are used as a proxy of absolute poverty. Lopez and Serven (2009) claim that poverty data is problematic because there are many missing values for several countries. Limited availability of data on poverty indicators is a problem for the analysis. Minimum periods T=3 without gaps are needed to run the regression and use an instrumental variables method. To avoid missing gaps, 3-years averages of each variable are taken.

The main objective of the thesis is to examine how poverty-trade openness relationship is influenced by potential key complementary factors. The empirical part of dissertation starts with a linear classical poverty model. Then, in order to perform analysis on complementarities, it is shown whether financial development, technological capabilities, and democratic governance enhance potential benefits of trade openness on poverty.

3.2. Model and methodology

The point of departure for an analysis is a standard regression equation of the classical poverty model[15] as follows:

$$P_{i,t} = \beta_1 OP_{i,t} + \beta_2 CV_{i,t} + \theta_t + \varphi_i + \varepsilon_{i,t} \qquad (1)$$

where $P_{i,t}$ is the log of poverty indicator for a country i at a period t, CV represents control variables and OP is a key explanatory variable, trade openness; θ_t is unobserved time effects and φ_i is country-specific effects; $\varepsilon_{i,t}$ is the error term.

Following Chang et al. (2009), Kpodar and Singh (2011) and Le Goff and Singh (2014), I add potential key complementary factors as interaction terms to have some country characteristics effects on poverty through trade openness. New regression equation is the following:

[13] Other transition countries are excluded due to data unavailability.

[14] In October 2015, World Bank updated international poverty line to $1.90 a day.

[15] See Dollar and Kraay (2001), Kpodar and Singh (2011), Guillaumont and Kpodar (2011) and Le Goff and Singh (2014).

$$P_{i,t} = \beta_1 OP_{i,t} + \beta_2 CV_{i,t} + \beta_3 OP_{i,t} * cv_{i,t} + \theta_t + \varphi_i + \varepsilon_{i,t} \quad (2)$$

where $cv_{i,t}$ corresponds to the level of financial development, technological capabilities, and democratic governance in the country *i* at time *t.*

This study applies cross-country analysis with two poverty indicators. *Headcount index*, which is the proportion of a population that lives below the poverty line and *poverty gap* which is the mean shortfall in consumption or income from the poverty line[16]. As a dependent variable, this study uses poverty headcount and poverty gap considering the $1.90 poverty line. The key explanatory variable, trade openness is the sum of exports and imports as a share of GDP.

Control variables - GDP per capita to control for economic development; inflation to control for macroeconomic instability (Loayza et al., 2004); health expenditure to control for health status across countries which covers the provision of health services and nutrition activities; financial depth which is represented by private credit over GDP; a good indication of the democracy and autocracy of a country is measured by the polity score. It is drawn from the Polity IV database which is commonly used in many studies (Popov and Polterovich, 2005; Ross 2005/2006; Fabella and Oyales, 2008)[17]; technological capability index is constructed by factor analysis.

To construct the technological capability index the missing data are estimated by the hot deck imputation procedure[18]. Full coverage in the dataset allows us to estimate factor loadings and variances in factor analysis method. Fagerberg and Srholec (2007/2008/2009) introduces a modified factor analysis approach to develop a technological capability index. Moreover, they create indices of the education system, innovation system, governance, financial system, business regulation, social capital, political system, openness, social capability, poverty trap and formal democracy. The plot in Appendix 8 shows the factor score[19] on the technological capability against GDP per capita for transition countries, results obtained in our analysis are

[16] Based on World Bank definition.
[17] I use only two scales from the database: the autocracy scale and the democracy scale.
[18] Schonlau (2006) - in Stata 13.0.
[19] See Appendix 9 for an overview of the factor scores by country.

similar to findings from Fagerberg and Srholec (2008), who claim that there is positive relationship between technological capability and GDP per capita (in PPPs) in developed and developing countries. This framework confirms the theory of convergence, which states that poorer economies "catch-up" in their use of technology (Solow, 1957; Romer, 1990).

To conduct factor analysis, it is necessary to know how many factors to use, and also determine loadings (Milan and Whittaker, 1995)[20]. Based on previous studies, I use weighting scheme, where each weight is between zero and one, which creates an index of technological capability (Fagerberg and Srholec, 2007/2008/2009). The most important part is how to come up with some value for the weight for each indicator of technological capability. Factor analysis is intended to find these weights. The correlation between technological capabilities and sub-indicators will determine how movement occurs in the indicator variables as technological capability changes. An equation for technological capabilities index is following;

$$TC_{i,t} = \omega_{IU_{i,t}} IU_{i,t} + \omega_{PCT_{i,t}} PCT_{i,t} + \omega_{RD_{i,t}} RD_{i,t} + \omega_{TR_{i,t}} TR_{i,t} + + \omega_{FT_{i,t}} FT_{i,t} + \omega_{SE_{i,t}} SE_{i,t} + \omega_{TE_{i,t}} TE_{i,t} + \omega_{PT_{i,t}} PT_{i,t} + \gamma_{i,t} \quad (3)$$

Where ω is the weight each score is given and γ is some random term. Also, the subscripts *i* and *t* represent country and time period, respectively;

Sub-indicators: Internet users (IU), PCT international patent applications (PCT), research and development expenditure (RD), trademark applications (TR), secondary school enrollment (SE), tertiary school enrollment (TE), fixed telephone subscriptions (FT) and primary school pupil-teacher ratio (PT). When conducting technological capabilities index, the correlations between mentioned sub-indicators determine weight ω which I have used in equation (3). Several econometric problems may arise from estimating equations (1) and (2). Frankel and Romer (1999) claim that there is a causal relationship between trade openness and economic growth, which implies endogeneity of trade openness. Many studies claim that trade

[20] Some indicators of following countries are excluded in factor analysis while constructing technological capability index. There are no data for:
1.Trademark data for Armenia
2.Patent and R&D for Albania, Croatia, Laos
3.Primary school pupil-teacher ratio for Montenegro

liberalization also has a strong causal effect on income (Feyrer, 2009). In addition, regressors might be correlated with the error terms due to reverse causality and omitted variable bias.

At first, the benchmark of classical poverty model is estimated by pooled OLS, random effects and fixed effects model. Next, equations (1) and (2) are estimated using the System Generalized Method-of-Moment (GMM) to take into account country-specific effects and the possible endogeneity[21]. The system GMM estimation procedure is adopted because Blundell and Bond (1998) suggest that first difference GMM may suffer from weak instrumentation when dataset is not too large. Estimated coefficients and z-statistics based on the one-step GMM estimates are presented in this study[22]. Another option might be to estimate dynamic poverty model, but when they are implemented, they have inferior results and not suitable for estimating the causal effect[23]. The reliability of the GMM estimation depends very much on whether lagged values of the explanatory variables are valid instruments in the poverty regression. A serial correlation test shows that there is no second-order correlation in error term[24] and Sargan test of overidentifying restrictions demonstrates that instruments are valid.

4. Results

Before estimating regression equations of classical poverty model through econometric analysis, the present study takes into account the plots presented in Figure 1. They compare the poverty-trade openness relationship in the top country group and the bottom group country in terms of technological capability, democratic governance, and financial development[25]. Plots clearly suggest that the effect of trade openness on poverty varies by potential key complementary factors[26].

[21] To avoid over-instrumentation, the "collapse" option of xtabond2 for STATA.13 is used, which is recommended by Roodman (2006). While the right-hand side variables in equation (2) and (3) are treated as predetermined or suspected endogenous variables, they are instrumented by their second valid lagged values.
See Le Goff and Singh (2014) and Kpodar and Singh (2011).

[22] See Kpodar and Singh (2011).

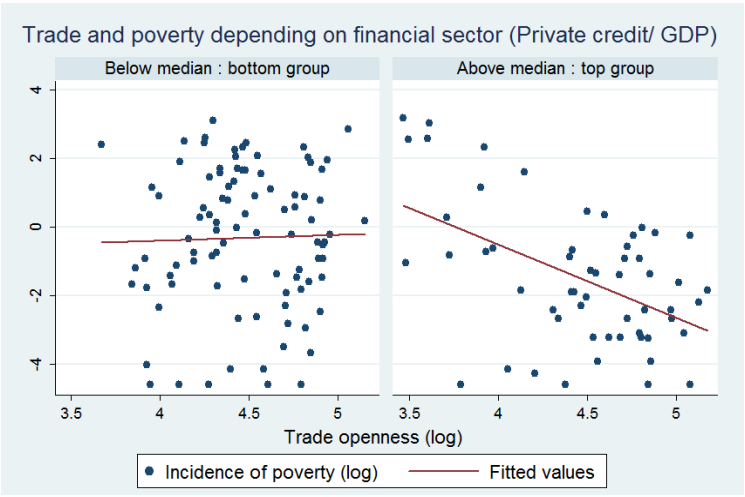
[23] See Appendix 10 column 3.

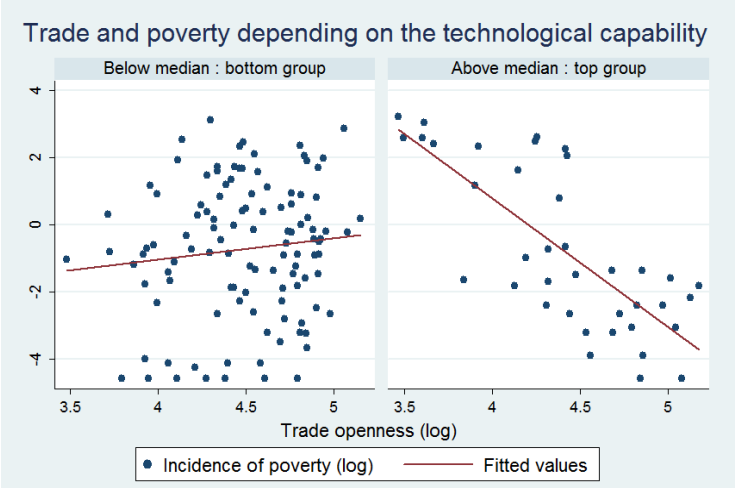
[24] No serial autocorrelation can be explained as follows. Let u_{it} be the error term for country *i* in period *t*.
Second-order serial correlation is given by $E\,(u_{it}-u_{it-1})\,(u_{it-2}-u_{it-3}) = E\,(u_t u_{it-2}-u_{it}u_{t-3}-u_{it-1}u_{it-2}+u_{it-1}u_{it-3}) = 0$.

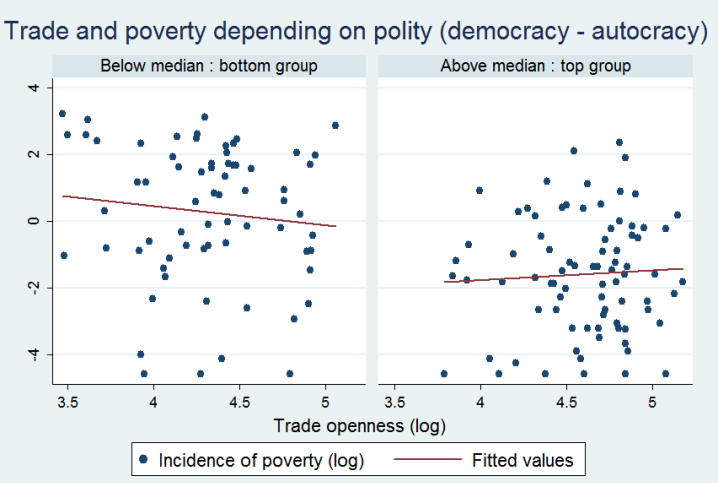
[25] Countries are named as the top (bottom) group if their mean of financial development, democratic governance and technological capability are above (below) the median in the sample.

[26] See Chang et al. (2009) and Le Goff and Singh (2014).

Figure 1. Incidence of poverty and trade openness for top and bottom groups







When trade-poverty relationship depends on the technological capability and financial development there is a strong negative relationship in the top country group, on the other hand, there is no clear or even positive relationship in the bottom group. In the case of democratic governance, the situation is the opposite, countries which are below median (more authoritarian government) have less poverty, but trade-poverty relationship becomes positive in top group or shows no clear relationship.

Table 1. Benchmark classical poverty model

Dependent variable: Poverty Headcount ratio (log)	**Pooled OLS**	**Random effects model**	**Fixed effects model**
Trade openness (log)	-0.258	0.275	1.782**
	(-0.669)	(0.562)	(2.471)
Health expenditure (log)	-0.516	0.013	1.161
	(-1.297)	(0.025)	(1.526)
GDP per capita (log)	-1.353***	-1.420***	-1.447**
	(-7.887)	(-6.014)	(-2.496)
Inflation (log)	-0.235*	-0.093	-0.032
	(-1.779)	(-0.721)	(-0.230)
Private credit/GDP (log)	-0.121	-0.315*	-0.560***
	(-0.713)	(-1.877)	(-3.141)
Polity	-0.039*	-0.038	-0.034
	(-1.673)	(-1.153)	(-0.590)
Technological capabilities	-0.372	-0.432**	-0.440**
	(-1.621)	(-2.078)	(-2.009)
Constant	14.739***	10.655***	-0.006
	(7.442)	(4.033)	(-0.001)
Breusch-Pagan (p_value)		0.002	
Hausman (p_value)			0.018
Number of countries	28	28	28
Number of observations	144	144	144
Time effects	YES	YES	YES
R-squared overall	0.693	0.665	0.451

Notes: Data are averaged over three years.

Absolute value of z statistics in parentheses.

* Significant at 10% ** Significant at 5% *** Significant at 1%.

Next step is to estimate econometric models. The fixed effect model is preferred to pooled OLS and random effects models, which is confirmed by Breusch-Pagan and Hausman tests. Results in Table 1 column (3) coincides with results in Table 2 column (1). So, the benchmark classical poverty model estimated by fixed effects model and system GMM is similar in terms of their key results about the relationship between trade openness and poverty. The log transformation

of all the variables except polity index and technological capability allows us to interpret the coefficients as elasticities. So, the negative sign of coefficients shows a decrease in the incidence and depth of poverty.

In Table 1 and 2, columns (3 and 1) illustrate that higher trade openness is associated with higher poverty. ***This gives answer to the first research question: does trade reduce poverty? The present study shows that it does not.*** The negative and significant coefficient of gross domestic product per capita shows that when transition countries become more developed they have lower levels of poverty[27]. A negative sign of the coefficient of private credit shows a reduction in poverty headcount, results are consistent with Le Goff and Singh (2014), Beck et al. (2007), Jalilian and Kirkpatrick (2005), Singh and Kpodar (2011) and Quartey (2005). A positive sign of trade openness is in good agreement with Topalova (2004), who suggests that decline in tariffs is related to higher incidence of poverty in India[28]. A negative and significant coefficient of technological capability confirms Fagerberg and Srholec (2008) findings that it is a reason for economic growth, which is negatively associated with "poverty trap" index.

The results of equation (2) from the regression model with interaction terms are presented in Table 2 columns (2, 3, and 4) for incidence of poverty. I obtain trade-poverty relationship which depends on potential key complementary factor, technological capabilities (column 2 in Table 2). The coefficient of the interaction term with technological capability (TC) is insignificant, suggesting the lack of complementarity between technological capabilities and trade openness. Based on this finding, despite greater technological capabilities, higher trade openness in transition economies does not influence extreme poverty. The absence of complementarity on poverty reduction could be explained by the fact that technological capabilities might not enable trade openness to have poverty reducing effects, so benefits of trade openness will not outweigh costs when it is accompanied by technological capabilities. A lack of importance for poverty reduction is mentioned by Bhalla (2002), who claims that technological development is associated with an absolute decline in standards of living of the poor.

[27] Lopez and Serven (2009) find a significant and negative effect of poverty on growth (GDP per capita).
[28] A reduction in tariffs could lead to higher export and import values, which means higher trade openness (IMF, 2005).

Table 2. Trade openness and headcount poverty in transition countries – system GMM

Dependent variable:	Benchmark model	Interaction with technological capability	Interaction with financial development	Interaction with polity
Headcount Poverty (log)	(1)	(2)	(3)	(4)
Trade openness (log)	3.086***	3.021***	1.894	-0.985
	(3.394)	(3.358)	(0.731)	(-0.557)
Health expenditure (log)	-1.364	-1.382	-1.348	-1.882*
	(-1.607)	(-1.634)	(-1.384)	(-1.959)
GDP per capita (log)	-0.666**	-0.651**	-0.654**	-1.246***
	(-2.160)	(-2.097)	(-2.123)	(-3.275)
Inflation (log)	0.014	0.012	0.031	0.031
	(0.087)	(0.073)	(0.189)	(0.172)
Private credit/GDP (log)	-0.460*	-0.453*	-1.779	-0.129
	(-1.825)	(-1.798)	(-0.469)	(-0.474)
Polity	0.02	0.022	0.011	-1.741*
	(0.431)	(0.441)	(0.215)	(-1.805)
Technological capabilities	-0.485*	-0.58	-0.419*	-0.031
	(-1.864)	(-0.253)	(-1.727)	(-0.102)
Technological capabilities*trade openness		0.019		
		(0.038)		
Private credit/GDP*trade openness			0.285	
			(0.346)	
Polity*trade openness				0.381*
				(1.754)
Constant	-1.691	-1.46	3.635	22.068**
	(-0.304)	(-0.264)	(-0.354)	(2.343)
Number of countries	28	28	28	28
Number of observations	144	144	144	144
Number of instruments	17	17	17	17
Sargan	0.255	0.325	0.273	0.157
AR(2)	0.638	0.625	0.550	0.463

Notes: Data are averaged over three years.

Absolute value of z statistics in parentheses

* Significant at 10% ** Significant at 5% *** Significant at 1%.

Results in column 3 of Table 2 suggest that relationship between trade openness and extreme poverty could be indifferent in terms of financial development. This finding is in good agreement with the specific sector model, which claims that trade tends to lower the real income of poor workers in import-competitive sectors and raise those in export-oriented industries (contradicts HO). For example, trade openness complemented with financial development will increase incomes of poor workers in export-oriented firms at the expense of poor workers in import-competing firms, ***and the overall effect of trade openness on poverty is lost.***

Last but not least, I test whether the relationship between trade openness and poverty depends on a country's democratic status. Results suggest that trade openness complemented with democratic governance causes higher poverty (column 4, Table 2). According to system GMM estimates, as transition countries become more democratic and have a high penetration of imports and exports, these together end up with the country having a higher gap between poor and rich people, i.e. higher poverty. There is no evidence of complementarities between democratic governance and trade based on this analysis.

5. Additional Estimates and Robustness tests

The additional robustness analysis of my key results focuses on import and export instead of trade openness and checks whether these indicators affect poverty similarly. Results in Appendix 10 suggest that higher export and import as a share of GDP are associated with higher poverty, which coincides with previous findings in Table 2 column 1. The effect of import as a share of GDP on poverty is also supported by Davis and Mishra (2006) and Harrison (2006/2008), who suggest that increasing import values might worsen poverty. Moreover, based on this study while export as a share of GDP is higher poor become poorer in transition countries. The question arises whether this negative effect on poverty is caused by an export structure. Exports have a significant effect on economic performance not only because of specialization but it is also important to distinguish what types of goods countries trade (Rodrik, et al., 2006). In general, higher exports cause more knowledge transfers and positive externalities, poor might benefit from that (Harrison, 2008/2013). On the other hand, the composition of export might matter for poverty reduction, particularly it is important to take into account what you trade.

Damijan et al. (2008) studied the export performance of transition economies and focused on the structure of merchandise exports of new EU Member states[29]. They suggest that the export structure of the transition countries passed through fundamental changes after transition process from centrally planned to market economies. The share of medium and high skill intensive manufacturers increased, on the other hand, the share of labor intensive goods decreased during 1995-2004. Based on the literature, labor-intensive manufacturers are mostly poorer people. Under these circumstances, the poor might become poorer because their shares decreased over time, benefits from trade openness will not trickle down to them. The overall effect on the poverty depends on the magnitude of the gains from income distribution, goods, and services reallocation and also on the structure of foreign trade.

Data of merchandise trade specialization index [30] in transition countries shows that goods which are produced by labor intensive, low skill, medium and high skill manufacturers are decreasing over time (see Appendix 12). In transition countries, goods are mostly labor intensive and produced by low-skilled worker. In recent times, higher-skills are required for good production, which becomes more competitive product. So, low-skill manufacturers' position in labor markets deteriorate. Countries which produce low-income goods might not benefit from trade openness because they face negative externalities, particularly specializing in these types of goods is costly (Rodrik et al., 2006).

The robustness of the findings based on equations (1) and (2) are examined in a number of ways. First, an alternative measure of absolute poverty - poverty gap is used in this study. It confirms the findings using the poverty headcount ratio [31]. Second, when outlier countries[32] are removed from the sample results still support previous findings for the poverty headcount ratio[33] and poverty gap[34]. Third, it is shown that export and import shares in benchmark classical poverty model confirm the observations for the trade openness. Results suggest that

[29] EU members in our sample : Bulgaria, Croatia, Czech Republic, Estonia, Latvia Lithuania, Romania, Hungary, Slovak Republic, Slovenia.

[30] Data were drawn from the United Nations Conference on Trade and Development (UNCTAD) statistics. It refers to the degree of specialization in the production or consumption of goods through trade: $TSI_{ij} = (X^i_j - M^i_j)/(X^i_j + M^i_j)$. Where X is export and M is import; TSI is trade specialization index; i and j represent country and product respectively.

[31] Sargan tests give a low p_value. The results could suffer from endogeneity problems (see Appendix 11).

[32] See Appendix 13.

[33] See Appendix 14.

[34] See Appendix 15.

higher import and export values lead higher poverty levels which are similar to the finding of trade openness (sum of exports and imports as a share of GDP). Fourth, dynamic benchmark classical poverty model in terms of the key result is similar with classical poverty model, particularly greater trade openness is associated with higher poverty and also higher lagged poverty leads to an increase in the number of the poor in transition countries.

6. Concluding remarks

Poverty is one of the central problems of society. Trade openness is considered as an efficient engine to improve economic performance, but still its relationship with poverty is unclear. There has been a lot of discussion in the literature on what should be the right way for poverty reduction. Based on empirical studies trade openness has both positive and negative effects on poverty rates, so the overall effect is ambiguous. However, author of this dissertation derive some results how trade maintains larger poverty in transition countries.

By focusing on transition countries paper empirically attempted to answer research questions, whether trade openness can actually reduce poverty and if democratic governance, technological capability, and financial development might enhance the beneficial effects of trade openness on poverty. Potential key complementary factors do not necessarily appear in practice in transition countries. The evidence suggests that relying on trade alone is not enough to reduce poverty. Furthermore, benchmark classical poverty model estimated shows that higher trade openness is associated in fact with higher absolute poverty in transition countries. This result reflects that the costs of trade openness outweigh benefits for the poor. Transition process from the closed to open economy requires new skills among workers because transition countries introduced new technologies on the market (Esposito and Stehrer, 2009). They have abundance of unskilled labor and demanding of them decreased over time. Many firms import machines to produce goods easily and efficiently, so skilled-labor might be more demanded than unskilled labor (Harrison and Hanson, 1999; Acemoglu et al., 2001).

The study also suggests that potential key complementary factors like financial development, technological capabilities, and democratic governance are not necessarily able to ensure

substantial reductions in poverty. Higher trade openness is associated with higher poverty when government becomes more democratic in transition countries, contrarily to what one might expect. The lack of complementarities can be explained by the limitations of potential benefits of trade openness on the poor in transition countries. Greater openness to trade has negative consequences on poverty reduction and even these broad factors studied here are not enough to overrun the negative effect of trade on poverty reduction. There should be other complementary factors, such as labor market reform which might potentially be needed for that (Topalova, 2004). Labor flexibility is a crucial factor for workers who cannot move easily from one sector to another. The majority of transition countries do not achieve high labor market flexibility (Svejnar, 2002a). In order to balance unequal effects of trade openness on poverty, there should not be any impediments to labor mobility.

This study's results have some implications for policy in transition countries. They support the idea that when firms demand skilled-labor then the poor (completely unskilled labor) will not benefit from specialization because they will not be employed in these sectors (Winters et al., 2006). Dissertation shows that poverty reduction trough trade openness does not have expected positive effects in transition countries. Government should balance positive and negative effects of trade openness in the short run, otherwise trade openness is not appropriate policy for poverty eradication. Therefore, government should take into consideration that the costs of trade openness hurt the poor the most, so rich might become richer and poor poorer.

Future studies should consider also labor market flexibility and firm entry-exit flexibility. Much work is still needed in order to fully understand how the mechanism works. Natural step would be to perform the same type of analysis with these country groups. Based on findings, export shares lead to an increase in incidence of poverty. It arises a question about export structure and how the poor are affected by exported different types of goods.

Appendix 1. Poverty rates and trade openness in transition countries

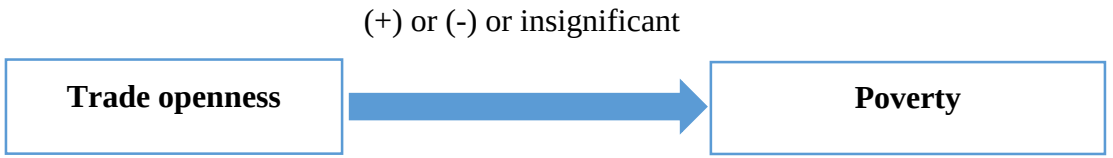
Head Count Ratio at 1.90$ Poverty Line	***Mean***	***Minimum***	***Maximum***
1990-1992	18.594	0.04	66.58
1993-1995	12.124	0.02	57
1996-1998	9.933	0.02	46.76
1999-2001	12.716	0.01	54.32
2002-2004	9.628	0.01	42.73
2005-2007	5.664	0.012	36.3
2008-2010	2.434	0.01	16.827
2011-2013	3.045	0.015	29.95

Poverty Gap at 1.90$ Poverty Line	***Mean***	***Minimum***	***Maximum***
1990-1992	5.785	0.01	24.37
1993-1995	4.001	0.01	22.4
1996-1998	3.216	0.01	13.46
1999-2001	3.708	0.003	17.49
2002-2004	2.610	0.01	11.79
2005-2007	1.625	0.003	9.47
2008-2010	0.728	0.003	5.507
2011-2013	1.008	0.01	7.76

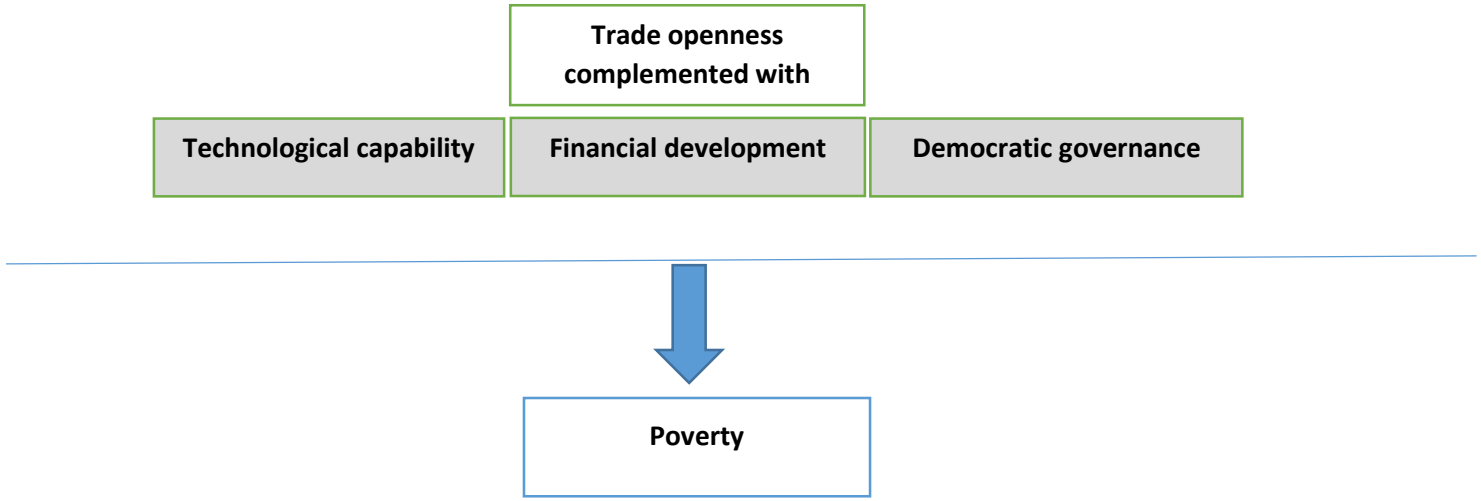
Trade Openness	***Mean***	***Minimum***	***Maximum***
1990-1992	71.321	32.103	149.337
1993-1995	78.174	37.409	136.699
1996-1998	80.433	32.602	148.232
1999-2001	88.629	36.922	159.869
2002-2004	94.443	51.173	135.760
2005-2007	101.408	51.291	161.103
2008-2010	98.258	48.064	155.169
2011-2013	109.337	42.638	177.601

Source: Author's own calculations

Appendix 2. The diagram below represents two research questions in more illustrative way.



Then, I examine the potential role of complementary factors:



Literature summary: direct effect of potential key complementary factors on poverty

Appendix 3

Appendix 3.1. Effect of Private Credit/GDP on poverty

Significant: Private credit/GDP	*Insignificant : Private credit/GDP*
Le Goff and Singh (2014)	Guillaumont and Kpodar (2011)
Beck, Demirguc-Kunt and Levine (2007)	Caner and Arestis (2004)
Jalilian and Kirkpatrick (2005)	Chigumira and Masiyandima (2003)
Singh and Kpodar (2011)	Fowowe and Abidoye (2013)
Quartey (2005)	Morduch (1999)

Appendix 3.2. Effect of Democracy on poverty

Significant: Polity	*Insignificant: Polity*
Oyeshile (2009)	Ross (2006)
Fabella and Oyales (2008) (interaction with trade openness)	Varshney (2002)

Appendix 3.3. Effect of technological capabilities on poverty

Significant: Technological capabilities	*Insignificant: Technological capabilities*
Fagerberg and Srholec (2008/2009)	Bhalla (2002)
Ventura (2001)	

Source: Author's own elaboration

Appendix 4. Variable definition and sources

Variables	Descriptions	Sources
Poverty incidence	The percentage of the population living below the $1.90/day international poverty line	World Bank Global Poverty Index Database and PovcalNet
Poverty gap	The average shortfall of the poor with respect to the poverty line, multiplied by headcount ratio	
Trade openness	Sum of exports and imports as a share of GDP	International Financial Statistics and World Development Indicators Database
Inflation	Annual percentage change in consumer prices	
GDP per capita	Nominal GDP divided by population size	
Health expenditure	The sum of public and private health expenditure (% of GDP)	
Private credit/GDP	Domestic credit to private sector (% of GDP)	
Polity	Polity scale ranges from +10 (strongly democratic) to -10 (strongly autocratic)	The Integrated Network for Societal Conflict Research, POLITY IV Project.
Fixed telephone subscriptions	The sum of active number of analogue fixed telephone lines, voice-over-IP (VoIP) subscriptions, fixed wireless local loop (WLL) subscriptions, ISDN voice-channel equivalents and fixed public payphones	World Development Indicators Database
Internet users	Individuals who have used Internet in the last 12 months	
PCT international patent applications	Worldwide patent applications filed through the Patent Cooperation Treaty procedure	
Research and development expenditure	Expenditures for research and development (% of GDP) are current and capital expenditures	
Trademark applications	Direct resident trademark applications which are filed by applicants from abroad directly at a given national IP office	
Secondary school enrollment	Total enrollment in secondary education	
Tertiary school enrolment	Total enrollment in tertiary education	
Primary school pupil-teacher ratio	The average number of pupils per teacher in primary school.	
Export	The value of all goods and other market services provided to the rest of the world (% GDP)	
Import	All goods and other market services received from the rest of the world (%GDP)	

Appendix 5. Summary statistics and correlation matrix

Variable	Observations	Mean	Standard deviation	Minimum	Maximum
Poverty incidence	163	8.028	13.51	0.007	66.58
Poverty gap	157	2.471	4.452	0.003	24.37
Trade openness	217	91.033	31.669	32.103	177.601
GDP per capita	219	4460.393	5064.913	163.073	25184.4
Inflation	203	64.185	240.088	0.484	2000.948
Health expenditure	203	57.113	20.983	5.215	90.888
Private credit/GDP	204	32.220	26.117	2.232	129.838
Polity	217	3.828	6.239	-7	10
Technological capability	232	-0.013	0.858	-1.940	1.988
Import	215	49.815	17.693	14.902	93.570
Export	215	42.234	16.548	10.595	90.299
Internet users	190	18.679	22.567	0.003	78.096
Patent applications	192	7225.234	44405.62	1	552026
Research and development expenditures	159	0.678	0.456	0.037	2.582
Trademark applications	196	23199.33	131589.7	1.5	1500000
Fixed telephone subscriptions	219	19.513	11.917	0.039	50.655
Secondary school enrollment	204	85.191	18.227	17.327	108.94
Primary school pupil-teacher ratio	203	19.840	7.641	8.680	55.859
Tertiary school enrollment	214	37.838	21.315	0.779	90.014

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
Poverty incidence (1)	1																		
Poverty gap (2)	0.988	1																	
Trade openness (3)	-0.241	-0.233	1																
Health expenditure (4)	-0.553	-0.524	0.127	1															
GDP per capita (5)	-0.443	-0.394	0.387	0.500	1														
Inflation (6)	-0.035	-0.038	0.012	-0.055	-0.186	1													
Private credit/GDP (7)	0.123	0.155	-0.154	0.068	0.290	-0.204	1												
Polity (8)	-0.576	-0.543	0.355	0.533	0.454	-0.117	-0.085	1											
Technological capability (9)	-0.357	-0.351	0.204	0.013	0.393	-0.171	0.264	0.222	1										
Internet users (10)	-0.393	-0.350	0.483	0.291	0.867	-0.214	0.330	0.392	0.607	1									
Patent applications (11)	0.179	0.147	-0.320	-0.145	-0.106	-0.029	0.438	-0.365	0.087	-0.058	1								
Research and development expenditure (12)	-0.256	-0.230	0.118	0.478	0.603	-0.038	0.414	0.209	0.084	0.386	0.326	1							
Trademark applications (13)	0.31	0.288	-0.331	-0.184	-0.142	-0.049	0.556	-0.430	0.055	-0.091	0.938	0.304	1						
Fixed telephone subscriptions (14)	-0.584	-0.551	0.158	0.516	0.501	-0.150	0.204	0.393	0.262	0.405	-0.029	0.511	-0.068	1					
Secondary school enrollment (15)	-0.735	-0.723	0.501	0.394	0.544	-0.033	-0.164	0.529	0.383	0.579	-0.298	0.209	-0.427	0.531	1				
Primary school pupil-teacher ratio (16)	0.443	0.397	-0.18	-0.264	-0.477	0.114	-0.108	-0.429	-0.213	-0.497	0.073	-0.262	0.104	-0.572	-0.566	1			
Tertiary school enrollment (17)	-0.547	-0.519	0.345	0.304	0.624	-0.128	0.104	0.431	0.535	0.686	-0.178	0.357	-0.283	0.511	0.743	-0.430	1		
Import (18)	0.169	0.200	-0.146	-0.342	-0.065	-0.109	0.308	-0.179	0.118	0.039	0.161	0.022	0.207	0.018	0.062	-0.174	0.129	1	
Export (19)	0.210	0.245	-0.170	-0.228	0.001	0.022	0.314	-0.196	0.036	0.046	0.179	0.053	0.233	-0.065	-0.061	-0.062	0.030	0.804	1

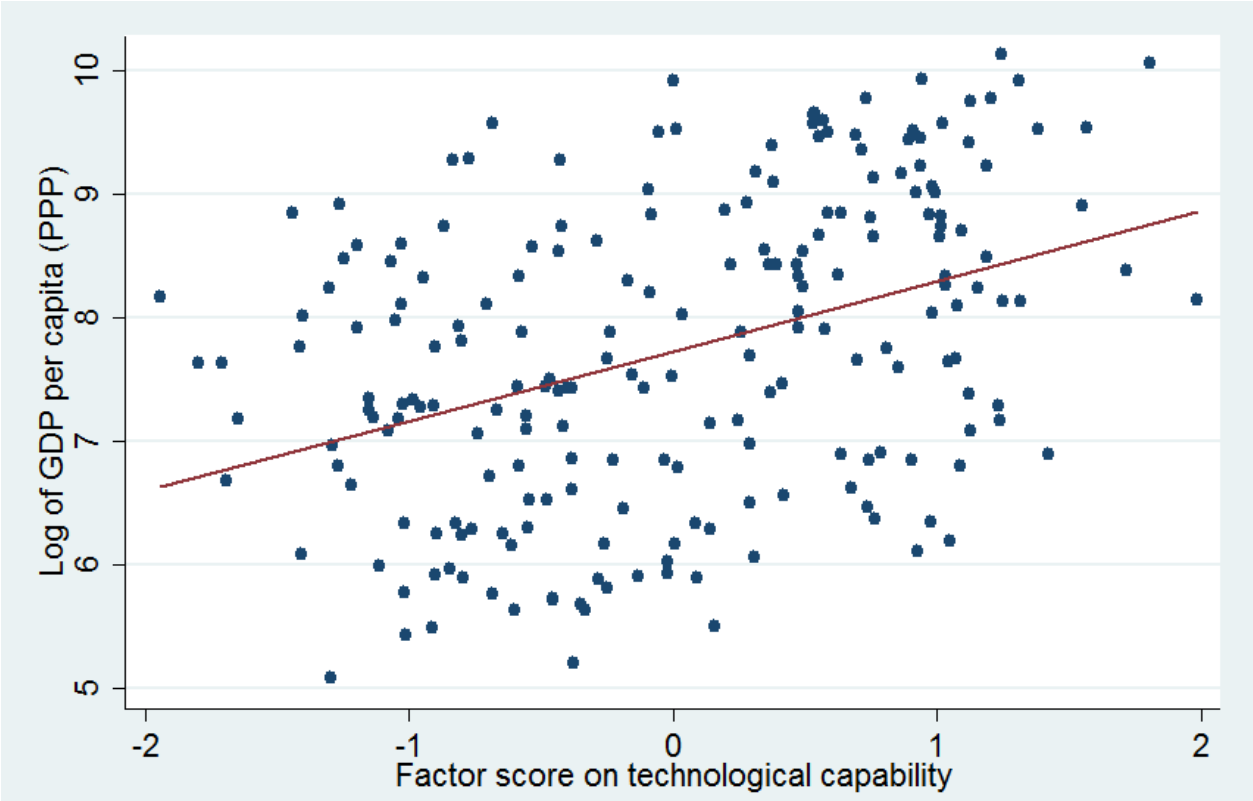
Appendix 6. Head count ratio at 1.90$ poverty line by income group

High-income countries	**Mean**	**Minimum**	**Maximum**	***Not High-income countries***	**Mean**	**Minimum**	**Maximum**
1990-1992	-	-	-	***1990-1992***	21.687	0.62	66.58
1993-1995	2.071	0.02	6.97	***1993-1995***	16.313	0.17	57
1996-1998	1.444	0.02	7.113	***1996-1998***	14.461	0.03	46.76
1999-2001	0.842	0.09	2.2967	***1999-2001***	16.956	0.01	54.32
2002-2004	0.478	0.073	1	***2002-2004***	12.857	0.007	42.73
2005-2007	0.573	0.017	1.52	***2005-2007***	7.808	0.047	36.3
2008-2010	0.35	0.01	1.38	***2008-2010***	3.605	0.01	16.827
2011-2013	0.522	0.015	1.345	***2011-2013***	4.792	0.043	29.95

Appendix 7. List of the sample countries (28)

Albania	Kyrgyz Republic
Armenia	Laos
Azerbaijan	Latvia
Belarus	Lithuania
Bulgaria	Moldova
Cambodia	Mongolia
China	Montenegro
Croatia	Poland
Czech Republic	Romania
Estonia	Russia
Georgia	Slovak Republic
Hungary	Slovenia
Iran	Tajikistan
Kazakhstan	Ukraine

Appendix 8. GDP per capita and technological capability (three-year average level over 1990-2013)



Source: Author's own calculations

Appendix 9. Overview of the factor scores by country

COUNTRY	***1990-1992***	***1993-1995***	***1996-1998***	***1999-2001***	***2002-2004***	***2005-2007***	***2008-2010***	***2011-2013***
Albania	-0.794	-0.821	-0.693	-0.556	-0.152	0.478	1.035	1.716
Armenia	-0.800	-1.110	-0.760	-0.185	-0.033	0.294	1.075	1.318
Azerbaijan	0.787	0.928	1.050	0.738	0.016	-0.802	-1.027	-1.263
Bulgaria	-0.983	-1.040	-0.667	-0.384	-0.239	0.471	1.014	1.547
Belarus	-0.480	-0.908	-0.954	-0.415	-0.004	0.493	1.008	0.973
China	-0.246	-0.612	-1.218	-0.384	0.245	0.698	1.034	1.015
Czech Republic	-1.028	-1.066	-0.867	-0.423	0.313	0.532	0.941	1.310
Croatia	-0.58	-1.243	-1.193	-0.434	0.280	0.717	1.018	1.383
Cambodia	-0.523	-0.331	-0.349	-0.453	-0.133	0.140	0.674	0.743
Estonia	-1.788	-1.402	-0.086	0.627	0.636	0.553	0.536	0.731
Georgia	-0.739	-0.551	-0.381	-0.477	-0.228	-0.463	0.259	1.987
Hungary	-1.940	-0.942	0.366	1.189	0.921	0.373	0.013	-0.054
Latvia	-0.949	-1.411	-0.812	-0.172	0.762	1.185	0.693	0.530
Lithuania	-0.962	-1.619	-0.952	0.287	0.746	0.867	0.938	0.568
Kazakhstan	-1.149	-0.553	-1.152	0.140	-0.248	0.492	0.991	1.121
Kyrgyz Republic	-1.019	-0.845	-0.900	-0.601	-0.021	0.974	1.089	1.126
Laos	-1.013	-1.016	-0.681	-0.454	0.092	0.767	1.420	1.230
Moldova	-1.690	-0.895	-0.258	-0.282	0.084	0.637	1.120	1.044
Montenegro	0.344	0.344	0.344	0.416	0.573	0.393	-0.080	-1.440
Mongolia	-1.270	-1.404	-0.643	0.010	0.289	1.241	1.068	0.477
Poland	-1.798	-1.049	-0.580	0.216	0.555	0.761	0.893	0.907
Romania	-1.644	-1.133	-0.434	-0.108	0.475	1.091	0.983	0.378
Russia	-0.708	-1.193	-0.902	-0.590	0.034	0.587	0.935	1.568
Slovak Republic	-0.572	-1.302	-0.534	-0.285	-0.090	0.587	1.125	1.202
Slovenia	-0.224	-0.427	-0.772	-0.832	-0.684	-0.000	1.242	1.805
Tajikistan	0.307	0.158	-0.374	-1.293	-0.914	-0.017	0.420	0.906
Ukraine	-1.022	-1.289	-0.581	-0.541	0.289	0.811	0.983	1.154
Iran	-1.710	-1.076	-0.399	0.369	0.851	1.251	0.348	0.198

Source: Author's own calculations

Robustness checks and additional estimates

Appendix 10. Benchmark classical poverty model

Dependent variable: Poverty Headcount (log)	Benchmark model (1)	Benchmark model (2)	Dynamic benchmark model (3)
Import (log)	**2.333****		
	(2.442)		
Export (log)		**2.162*****	
		(3.06)	
Poverty headcount (log)$_{t-1}$			**0.254****
			(2.021)
Trade openness (log)			**2.429****
			(2.289)
Health expenditure (log)	-1.398	-2.073**	(0.89)
	(-1.532)	(-2.350)	(-0.762)
GDP per capita (log)	-0.809***	-0.620*	-1.148**
	(-2.642)	(-1.896)	(-2.402)
Inflation (log)	-0.05	(0.026)	-0.052
	(-0.305)	(0.153)	(-0.291)
Private credit/GDP (log)	-0.318	-0.450*	-0.001
	(-1.242)	(-1.725)	(-0.003)
Polity	-0.022	0.071	0.048
	(-0.436)	(1.516)	(0.948)
Technological capabilities	-0.397	-0.454	-0.28
	(-1.438)	(-1.591)	(-0.964)
Constant	4.298	6.341	1.708
	(0.74)	(1.609)	(0.333)
Number of countries	28	28	28
Number of observations	146	146	112
Number of instruments	15	15	17
Sargan	0.127	0.340	0.001
AR(2)	0.450	0.725	0.229

Notes: Data are averaged over three years. Absolute value of z statistics in parentheses

* Significant at 10% ** Significant at 5% *** Significant at 1%.

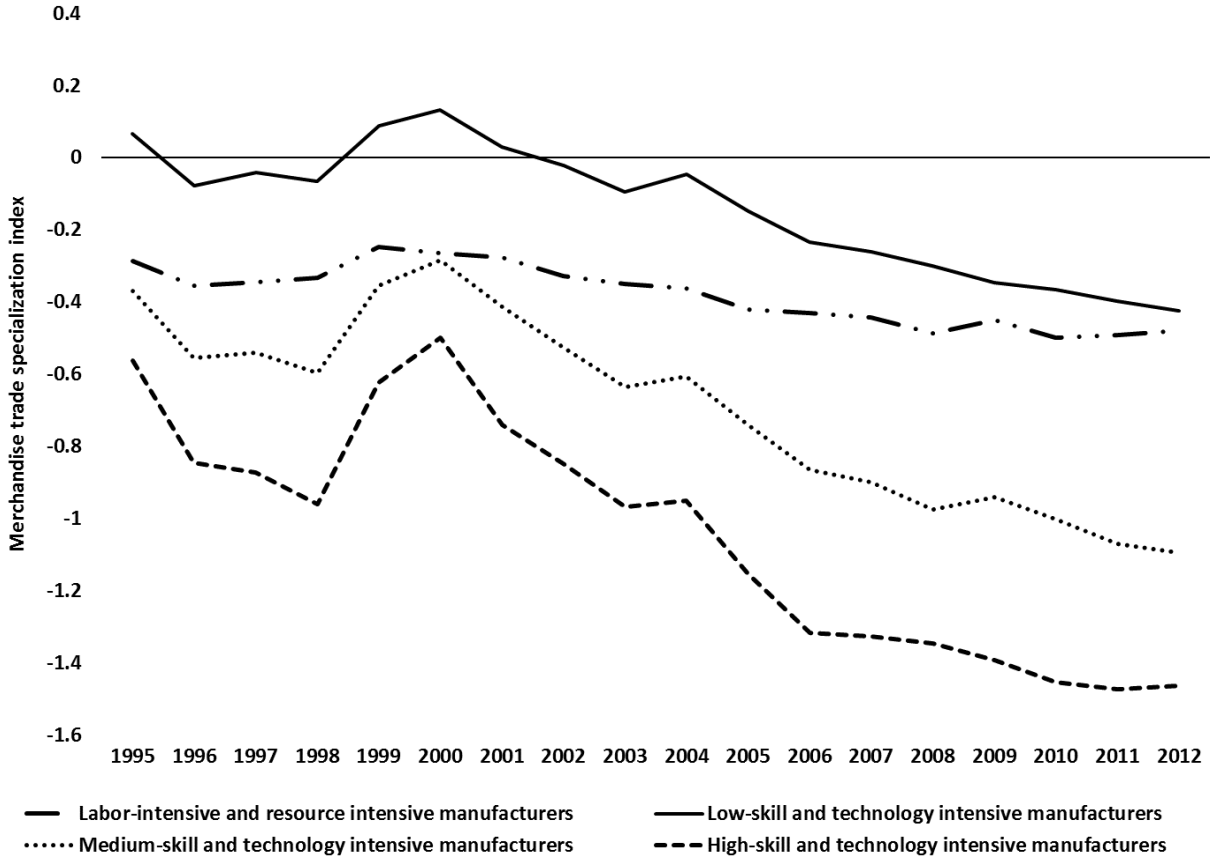
Appendix 11. Trade openness and poverty gap (alternative measure) in transition countries – system GMM

Dependent variable: Poverty Gap (log)	Benchmark model (1)	Interaction with technological capability (2)	Interaction with financial development (3)	Interaction with polity (4)
Trade openness (log)	3.844***	3.926***	0.432	-1.106
	(3.568)	(3.627)	(0.138)	(-0.559)
Health expenditure (log)	-0.249	-0.338	0.43	-1.249
	(-0.236)	(-0.322)	(0.335)	(-1.098)
GDP per capita (log)	-0.527	-0.526	-0.388	-1.174***
	(-1.519)	(-1.521)	(-1.129)	(-2.691)
Inflation (log)	0.011	0.036	-0.071	0.009
	(0.06)	(0.193)	(-0.381)	(0.042)
Private credit/GDP (log)	-0.593**	-0.606**	-5.729	-0.259
	(-2.024)	(-2.058)	(-1.208)	(-0.835)
Polity	0.033	0.022	-0.001	-2.346**
	(0.606)	(0.382)	(-0.010)	(-2.091)
Technological capabilities	-0.498*	-1.52	-0.577**	-0.018
	(-1.707)	(-0.548)	(-2.105)	(-0.049)
Technological capabilities*trade openness		0.233		
		(0.378)		
Private credit/GDP*trade openness			1.113	
			(1.086)	
Polity*trade openness				0.518**
				(2.054)
Constant	-11.344*	-11.354*	0.944	18.679*
	(-1.672)	(-1.671)	(0.078)	(1.718)
Number of countries	28	28	28	28
Number of observations	138	138	138	138
Number of instruments	17	17	17	17
Sargan	0.031	0.048	0.048	0.055
AR(2)	0.788	0.792	0.764	0.547

Notes: Data are averaged over three years. Absolute value of z statistics in parentheses.

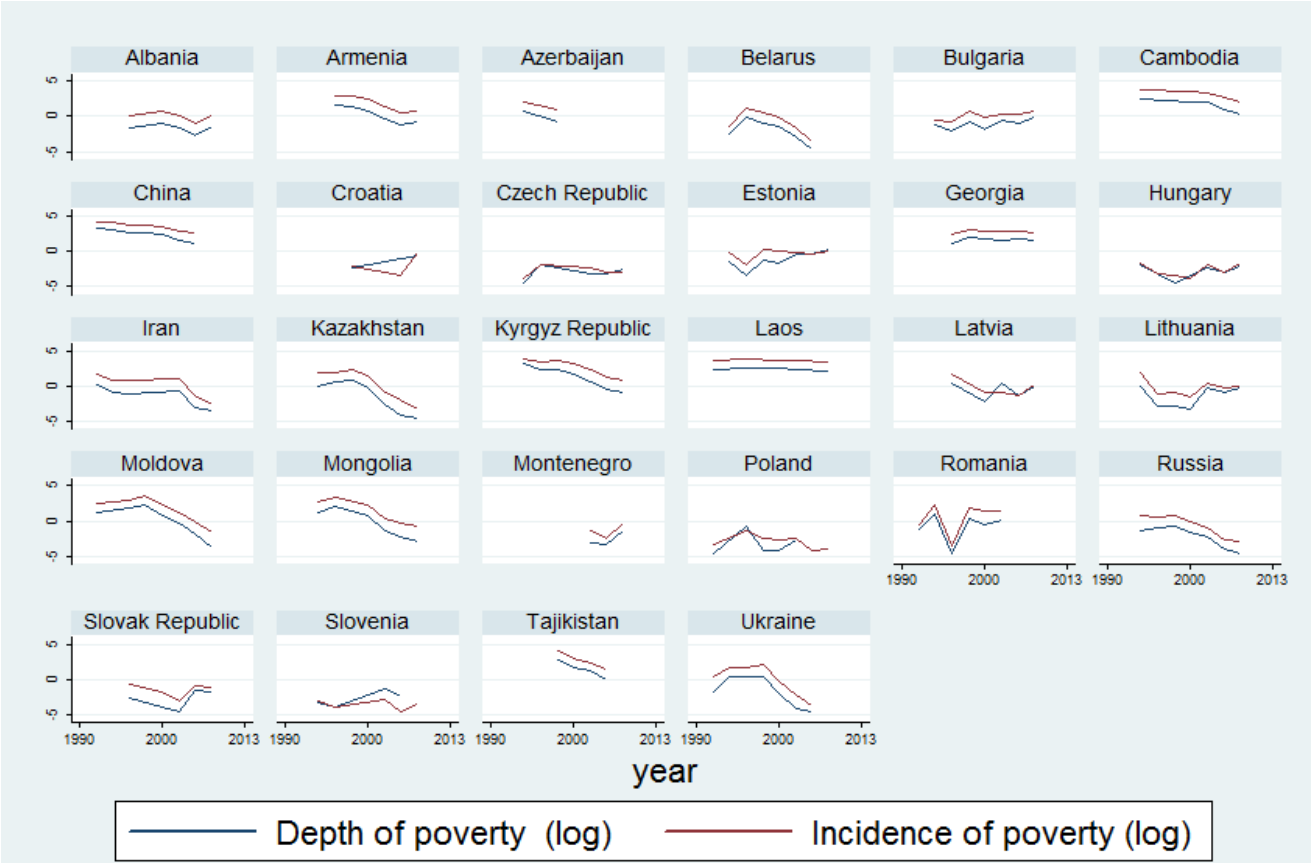
* Significant at 10% ** Significant at 5% *** Significant at 1%

Appendix 12. The merchandise trade specialization index in transition economies, 1995-2014



Source: Author's own calculation

Appendix 13. Excluding outlier countries: Azerbaijan, Croatia, Montenegro and Tajikistan



Appendix 14. Trade openness and poverty headcount in transition countries - system GMM excluding outlier countries

Dependent variable: Poverty Headcount (log)	Benchmark model (1)	Interaction with technological capability (2)	Interaction with financial development (3)	Interaction with polity (4)
Trade openness (log)	3.551***	3.383***	4.476	-1.837
	(2.944)	(2.846)	(1.307)	(-0.940)
Health expenditure (log)	-2.092**	-1.998**	-2.376*	-2.421**
	(-2.063)	(-1.995)	(-1.915)	(-2.050)
GDP per capita (log)	-0.673**	-0.660**	-0.742**	-1.193***
	(-2.099)	(-2.063)	(-2.234)	(-3.023)
Inflation (log)	-0.23	-0.261	-0.15	-0.127
	(-1.220)	(-1.398)	(-0.739)	(-0.553)
Private credit/GDP (log)	-0.262	-0.238	1.5	-0.329
	(-0.993)	(-0.893)	(0.338)	(-1.037)
Polity	0.001	0.014	0.013	-2.076**
	(0.022)	(0.242)	(0.212)	(-2.345)
Technological capabilities	-0.959***	-0.144	-0.796**	-0.039
	(-2.765)	(-0.058)	(-2.576)	(-0.089)
Technological capabilities*trade openness		-0.189		
		(-0.336)		
Private credit/GDP*trade openness			-0.397	
			(-0.413)	
Polity*trade openness				0.449**
				(2.242)
Constant	-0.651	-0.419	-3.308	28.770***
	(-0.096)	(-0.062)	(-0.256)	(3.002)
Number of countries	24	24	24	24
Number of observations	132	132	132	132
Number of instruments	17	17	17	17
Sargan	0.527	0.557	0.521	0.816
AR(2)	0.519	0.508	0.687	0.602

Notes: data are averaged over three years. Absolute value of z statistics in parentheses.

* Significant at 10% ** Significant at 5% *** Significant at 1%

Appendix 15. Trade openness and poverty gap in transition countries - system GMM excluding outlier countries

Dependent variable: Poverty Gap (log)	Benchmark model (1)	Interaction with technological capability (2)	Interaction with financial development (3)	Interaction with polity (4)
Trade openness (log)	4.166***	4.272***	1.664	-2.583
	(2.917)	(2.989)	(0.419)	(-1.156)
Health expenditure (log)	-0.782	-0.836	-0.324	-1.744
	(-0.615)	(-0.669)	(-0.203)	(-1.218)
GDP per capita (log)	-0.549	-0.568	-0.453	-1.157**
	(-1.542)	(-1.601)	(-1.264)	(-2.522)
Inflation (log)	-0.276	-0.272	-0.333	-0.158
	(-1.290)	(-1.271)	(-1.484)	(-0.598)
Private credit/GDP (log)	-0.264	-0.256	-3.582	-0.42
	(-0.874)	(-0.828)	(-0.679)	(-1.138)
Polity	0.03	0.032	0.004	-2.846***
	(0.455)	(0.448)	(0.063)	(-2.699)
Technological capabilities	-1.069***	-0.483	-1.076***	0.037
	(-2.819)	(-0.164)	(-3.156)	(0.071)
Technological capabilities*trade openness		-0.133		
		(-0.196)		
Private credit/GDP*trade openness			0.719	
			(0.629)	
Polity*trade openness				0.624***
				(2.626)
Constant	-10.748	-10.889	-1.587	28.083**
	(-1.278)	(-1.279)	(-0.109)	(2.476)
Number of countries	24	24	24	24
Number of observations	127	127	127	127
Number of instruments	17	17	17	17
Sargan	0.046	0.077	0.074	0.443
AR(2)	0.812	0.839	0.704	0.789

Notes: data are averaged over three years. Absolute value of z statistics in parentheses

* Significant at 10% ** Significant at 5% *** Significant at 1%

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